Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
SEP 2007		**00-00-2007 to 00-00-2007**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Summary of the Discussion on the Prediction of Earth Orientation Parameters	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **U.S. Naval Observatory,3450 Massachusetts Avenue NW,Washington,DC,20392-5420**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
Systèmes de référence spatio-temporels : Journées 2007, Paris, 17-19 September by N Capitaine; Observatoire de Paris. Journées; Observatoire de Paris. Département d'astronomie fondamentale. Publisher: [Paris, France : Observatoire de Paris, 2007] OCLC: 232989522

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**2**	

SUMMARY OF THE DISCUSSION ON THE PREDICTION OF EARTH ORIENTATION PARAMETERS

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This panel discussion took place after Session 4 entitled "Prediction, Combination, and Geophysical Interpretation of Earth Orientation Parameters." The panel, drawn from the membership of the IERS Working Group on Prediction (WGP), represented a broad cross section of the Earth Orientation Parameter (EOP) prediction community. W. Wooden, the chairperson of the WGP, served as moderator for the discussion. He introduced the panel members and explained that the purpose was to solicit input and suggestions from the conference attendees on the topics that are being considered by the working group. To stimulate subsequent discussion, each panel member gave their view on critical issues that need to be resolved for progress to be made in EOP prediction.

H. Schuh (Univ.Tech.Vienna) summarized the EOP Prediction Comparison Campaign and the interest generated by that activity. The primary conclusion was that prediction algorithms are extremely sensitive to the length of prediction required, i.e., there was no single algorithm that was best for all lengths of prediction. Additional conclusions were that a combination of deterministic and statistical components should be used, that predictions are better when geophysical fluid information is included, and that they also will improve when EOP measurements are obtained in near real-time.

W. Kosek (Space Research Centre, PAS), chairperson of the algorithms subgroup, summarized what we know about EOP data and their prediction. Namely, that EOP data have deterministic and stochastic components, that prediction accuracy is dependent on starting prediction epochs due to irregularities in the motion of the pole and the Earth's rotation, that prediction accuracy decreases with increasing prediction length, that prediction errors are much larger than the observational errors of the input data, that good approximation does not guarantee a good prediction, and that incorporating fluid excitation functions and forecasts improve prediction accuracy. Issues to be considered are how to best characterize differences between algorithms and what should be included in an algorithm for best results.

R. Gross (JPL), the head of the IERS Special Bureau of Oceans, spoke of his experience using a Kalman filter for EOP estimation in support of operational tracking and navigation of interplanetary spacecraft. The Kalman filter is particularly well suited to the task because of the stochastic nature of EOP. Frequently taken and rapidly processed measurements are necessary to meet stringent accuracies of spacecraft navigation. Results are greatly enhanced by incorporating atmospheric angular momentum data from weather models and somewhat improved from also including oceanic angular momentum.

T. van Dam (Univ.Luxembourg), chairperson of the input data subgroup, is head of the IERS Global Geophysical Fluids Center (GGFC) and spoke of her role in providing multiple new sources of potentially useful data and model information from the GGFC that can improve EOP prediction. It appears that there is significant unmodeled signal content in the time series of EOP, and the mass transport of geophysical fluids is a likely source. A better understanding/modeling of this process could reduce EOP prediction errors.

D. Salstein (Atmos.Environ.Research), the head of the IERS Special Bureau for the Atmosphere, has done extensive research of dynamical predictions of geophysical fluids (esp., atmosphere) angular momentum, for which connections to the EOP predictions may be made. He reviewed the model-based

analyses and forecasts of atmospheric angular momentum (AAM), talked about the components of AAM and the relationship to EOP, and gave an outlook of forecast skill as it relates to EOP prediction.

After the summaries by each panel member, the following list of questions was presented to solicit comments and suggestions from the attendees of the meeting:

1. How far into the future are predictions needed?
2. How often are updates needed?
3. Is precession/nutation modeling good enough to forget about celestial pole offset predictions?
4. What can be done to minimize data latency?
5. Are there other data sets with geophysical information that can be used in prediction?
6. What criteria should be used for comparing algorithms?
7. Should we focus on improving polar motion or UT1-UTC?
8. What criteria define a good algorithm?
9. Are there dynamical predictions of geophysical fluids angular momentum connections to EOP?
10. What other improvements are needed?
11. What statistics should be used for comparisons?

There was lively participation from the audience. Some questions were asked about accuracies of predictions and members of the audience suggested other models should also be considered. Unfortunately, time was short so not all of the listed questions could be considered by the audience. W. Wooden thanked the audience for their comments and suggestions and invited them to share any additional comments or suggestions with the panel members after the closing of the session. The reader is directed to other papers in this session for more detail on some of the work by the panel and others involved in EOP prediction activity.